The Conceptual Model Holistic (MCH): Neuroeducation And Motor Inclusion In The Urban Context Of Naples

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***Abstract*— This Holistic Conceptual Model (HCM) is born from over forty years of direct experience in the Italian school system, particularly in the metropolitan city of Naples. Throughout a career dedicated to teaching and research, I have developed the firm belief that physical education cannot be relegated to a secondary discipline, especially in complex sociocultural and economic contexts like those of Naples.**

Keyword: Neurodidactics, Motor Literacy, Simplexité, Educational System, Neapolitan Context, School Innovation, Research Methodology

I. INTRODUCTION (*Heading 1*)

This research addresses the need to transform the role of Physical Education (PE) in the contemporary Italian education system, focusing specifically on the reality of lower secondary schools in the urban context of Naples. Historically, PE in Italy has oscillated between militaristic, hygienist models , and, more recently, a technical vision oriented towards athletic performance. However, the post-pandemic educational landscape has highlighted the inadequacy of these paradigms in the face of growing socio-educational complexity.

The implementation of the Conceptual Model Holistic Learning (MCH) does not occur in a neutral space, but rather in a complex urban context, characterized by strong socioeconomic contrasts that directly impact learning processes. The need for this intervention is supported by local monitoring data, which depict a highly fragile school system. According to reports on early school dropout and national INVALSI surveys, a significant correlation is observed between families' socioeconomic and cultural status (ESCS) and student performance in key skills, with marked gaps precisely in those peripheral areas where the early school dropout rate is alarming.

These data confirm that middle schools in Naples face a systemic challenge. In many neighborhoods in the historic center and the suburbs, schooling represents the sole bastion of legality; however, traditional teaching methods often appear inadequate to counter the alienation of students living in disadvantaged contexts. The core problem lies in the gap between scientific evidence linking physical activity to the development of executive functions (EF) and everyday teaching practices, which often lack an applied neuropedagogical foundation.

This research proposes the Conceptual Model Holistic (MCH) as a catalyst to promote quality physical education, capable of integrating three fundamental pillars: *physical literacy ,* Alain Berthoz's theory of *simplexité , and* applied neuroeducation .

The overall objective of the study is to evaluate the impact of MCH in optimizing socio-pedagogical inclusion in students aged 11-14. Specifically, the research aims to determine the extent to which a neurocognitive- based PE curriculum can act as a lever for enhancing executive functions—attention, inhibition, and working memory—while providing validated operational tools to transform even small spaces, such as those typical of Neapolitan schools, into inclusive, equitable, and evidence-based learning laboratories.

2. The Neapolitan Context: Challenges and Complexities in the Educational System

The implementation of the Conceptual Model Holistic Physical Education (PHE) does not take place in a neutral context, but rather in a complex urban setting like Naples, characterized by profound socioeconomic contrasts that directly impact learning processes and the quality of school life. The need for a renewal of the educational paradigm of PE is supported by local monitoring data, which outline a highly fragile school system. According to reports on early school dropout and national INVALSI surveys, a significant correlation is observed between families' socioeconomic and cultural status (SES) and student performance in key skills, with particularly marked gaps in peripheral areas, where the early school dropout rate, in some schools, exceeds regional averages.

These data, analyzed over the course of many years of professional experience as a researcher and trainer in the field of youth distress and guidance, confirm that middle schools in Naples face a systemic challenge. Although schools represent, in many neighborhoods of the historic center and the suburbs, the only bastion of legality and positive social interaction, traditional teaching often fails to engage those students living in disadvantaged contexts, who

perceive the institution as distant or alien to their daily lives. This research aims to address precisely this alienation: exercise, when oriented toward a neurocognitive goal , ceases to be a simple "time to let off steam" and becomes a tool for redemption and for strengthening executive functions, essential for academic success and retention.

A second challenge is the chronic lack of adequate spaces for physical activity . An analysis of school infrastructure in Naples highlights a shortage of standard gyms, often forcing physical activity to be conducted in corridors, narrow courtyards, or converted classrooms. This limitation has historically relegated the discipline to a marginal role. However, the quality of the physical experience depends not solely on the availability of expensive equipment, but on the cognitive richness of the learning stimulus. The MCH, through Berthoz 's *simplexité approach* , teaches teachers how to transform even small spaces and limited resources into motor learning laboratories, where the complexity of movement and social cooperation compensate for the lack of infrastructure.

Finally, the cultural and social diversity of Neapolitan students requires an inclusive pedagogy based on empathy and emotional safety. In an environment where tension can be high, physical activity planned according to the MCH model acts as a neurophysiological regulator. By creating a "safe space" *within physical* activity, the model reduces levels of cortisol—the stress hormone—and promotes brain plasticity, allowing even the most vulnerable students to actively participate, feel part of the group, and develop the transversal skills that are the heart of inclusive education.

In this sense, the project aims to be an exportable model: demonstrating that, by acting on the neurocognitive system through movement in a complex reality like Naples, it is possible to generate systemic change that can be replicated in other urban contexts characterized by similar dynamics of vulnerability.

3. The Theory of *Simplexité* as a Neuro-didactic Foundation

To overcome the structural limitations and socio-emotional fragilities described, the Conceptual Model Holistic (MCH) integrates the principles of *simplexité* theorized by neurophysiologist Alain Berthoz. In an educational context characterized by high emotional density and a lack of space, the concept of *simplexité* —not simply "simplification," but rather "the art of managing complexity"—offers an extraordinarily effective pedagogical cornerstone.

The human brain, in the learning process, does not reduce the complexity of the external world, but uses cognitive strategies to select relevant information and ignore background noise, thus facilitating motor action. In physical education teaching, applying this principle means designing tasks that, even in confined spaces or chaotic contexts, require 11- to 14-year-old students to simultaneously activate several executive functions (EF): inhibition (impulse control), working memory (keeping the rules of the game), and cognitive flexibility (adapting to changing situations).

The effectiveness of *simplexité* in the Neapolitan context lies in its ability to transform an obstacle into a resource:

- **Space Management:** In the absence of a standard gym, *simplexity* suggests increasing the density of motor constraints. Instead of requiring large running spaces, MCH offers short courses that require rapid changes of direction, precarious balance, or close cooperation. This "concentrated complexity" forces the student's brain to maintain heightened attentional vigilance, reducing the scope for disruptive or disengaging behaviors.

- **Reducing performance anxiety:** Simplexity teaches that to perform an effective action, the brain must "anticipate" the consequences. The MCH teacher doesn't ask students to perform a perfect action, but to explore different motor solutions to solve a problem. This playful , inquiry-oriented approach reduces the fear of failure—a key factor in school anxiety—and promotes a "neurobiological confidence" necessary for synaptic plasticity.

- **Integration and Proactivity:** Theory suggests that movement is a proactive process. In a heterogeneous classroom, students must not only react to the teacher, but also be able to predict the actions of their classmates. Teaching students to "read" others' intentions through movement facilitates social cohesion and inclusion, transforming the classroom into a unified system of cooperation, essential in contexts where the social fabric is fragmented.

Practical Example: From Limit to Neuro-didactic Resource

To understand the effectiveness of the MCH, let's analyze the application of the principle of *simplexité* in a medium-sized classroom (about 40-50 m2) with fixed desks and no equipment.

The "before" situation: Motor stasis

In a traditional model, the lack of a gym is interpreted as an objective impossibility of holding a class. Physical education is often reduced to a theoretical lesson or a sedentary stretching activity. Students, at a developmental stage (11-14 years) that physiologically requires movement for neuroendocrine regulation, exhibit restlessness, distraction, and increasing social tension related to forced immobility. The restricted space becomes a stress factor, increasing behavioral inhibition or, conversely, latent aggression.

The "after" situation: The application of the MCH

By applying the MCH, the teacher transforms the classroom into a laboratory of *simplexity* . Instead of

attempting to reproduce team sports, movement tasks of varying complexity are introduced:

- **Proposed activity (e.g., "The Cognitive Labyrinth"):** Students must move between desks following movement rules that change based on acoustic or visual cues provided by the teacher (e.g., "when I clap my hands, the direction of travel changes"; "when I touch the table, my classmate must squat").

- **Managing Complexity:** The constraints of limited space become a challenging variable. The need to avoid bumping into classmates in a dense environment activates proprioception and selective attention. Students must constantly monitor their position relative to others, inhibit automatic responses, and plan their next trajectory.

- **Inclusive outcome:** In this scenario, the winner isn't the fastest or most athletic, but rather the one who demonstrates greater adaptability and control. Cooperation becomes essential: to complete the course without errors, students must point out obstacles to each other or coordinate their movements. The classroom becomes a *safe space* where the success of the activity depends on the emotional and motor self-regulation of the class.

4. The *Physical Literacy* as an Educational Horizon

Overcoming a purely athletic vision of Physical Education requires the adoption of *Physical Literacy* (Motor Literacy), a concept theorized by Margaret Whitehead. The *Physical Literacy* is not limited to the mere technical execution of a movement, but defines the motivation, confidence, physical competence, understanding, and knowledge that each individual possesses to enhance and sustain lifelong engagement in physical activity.

For students between the ages of 11 and 14—a critical transition phase marked by profound neurobiological and psychological changes—motor literacy is key to building a positive relationship with their bodies and their surroundings. In a complex context like Naples, where the risk of abandoning sports activities is high during the transition to secondary school, promoting *physical activity is crucial. Literacy* means offering students the tools to be "agents" of their own health and well-being.

The pillars of *Physical Literacy* in the MCH:

- **Motivation and Confidence:** MCH focuses on building a sense of self-efficacy. Through motor tasks that ensure progressive success, students develop the confidence needed to take on new challenges, overcoming the psychological barrier typical of adolescents who feel inadequate or awkward in traditional sports.

- **Physical Competence:** It's not about training for competitive performance, but rather honing movement skills in a variety of contexts. Being motor literate means knowing how to control your body flexibly and intelligently, a skill that applies to every context, from the classroom to the urban environment.

- **Knowledge and Understanding:** The *Physical Literacy* requires students to understand the "why" of the activity. Explaining to a 12-year-old how movement affects concentration or stress management transforms physical education class into a moment of mindful learning. This critical awareness is the basis for healthy lifestyle choices, counteracting sedentary lifestyles or risky behaviors.

Integrate the *Physical Literacy* in the MCH

Integrating this concept into the MCH means radically transforming educational assessment. We're no longer just evaluating running times or high jumps, but rather the student's ability to:

1. **Interpreting movement:** Knowing how to read the motor demands of a context (social or spatial).

2. **Adapting:** Demonstrating cognitive and motor flexibility in the face of unexpected events.

3. **Relating:** Using movement as a form of nonverbal and inclusive communication.

This holistic view of the individual transforms physical education into a path to active citizenship. When students feel physically "literate ," movement ceases to be a school-related constraint and becomes a lifelong personal resource, a physical and mental health asset that will last well beyond school.

5. Research Methodology and Effectiveness Indicators

(Use the KPI table and the description of the seventh shift.)

5. Research Methodology and Effectiveness Indicators

To validate the impact of the Conceptual Model Holistic (MCH), the research adopts a mixed approach (quantitative and qualitative). The objective is to monitor not only the improvement in motor skills, but also, above all, the increase in executive functions and social integration in students aged 11-14. The following table summarizes the key performance indicators (KPIs) defined for the scientific monitoring of the intervention.

Table 1: Indicator Matrix for the Evaluation of the MCH

Analysis Dimension	Key Performance Indicator (KPI)	Measuring Tool	Expected Goal
Executive Functions (EF)	Inhibition capacity and working memory	Short cognitive tests (pre /post MCH activity)	Improved reaction times and focus
Social Inclusion	Level of positive peer interaction	Structured systematic observation	Increase cohesion and reduce conflicts
Physical Literacy	Body awareness and self-efficacy	Self-assessment questionnaire (Likert scale)	Increased confidence in one's abilities
Classroom Climate	Perceived stress/cortisol level	Mood Rating Scale (POMS)	Stress reduction and greater serenity
Adaptability (Simplexité)	Motor task solving ability	Observation of problem - solving processes	Increased motor decision-making effectiveness

Description of the survey methodology

The effectiveness of the model will be monitored through a quarterly time scan, ensuring rigorous data collection:

- **Baseline Phase (T0):** Initial assessment of basic motor skills and the level of perceived stress within the class group, in the absence of MCH intervention.
- **Intermediate Phase (T1):** Monitoring executive fluency during MCH sessions. In this phase, observation focuses on students' ability to manage the "constraints" (limited space, variable rules) introduced by the teacher during lessons.
- **Final Phase (T2):** Long-term impact evaluation. The goal is to verify whether acquired motor literacy translates into greater decision-making autonomy and greater emotional stability within the overall school context.

This assessment structure responds to the need to lend scientific rigor to the project. The choice to integrate quantitative data (reaction times, tests) with qualitative indicators (observation of relational climate) allows us to capture the multidimensionality of the MCH. Furthermore, the focus on Executive Functions is strategically aligned with the current Ministry of Education guidelines regarding the enhancement of transversal skills and citizenship.

6. Research Hypothesis and Expected Results

In light of the theoretical framework outlined and the integration between *Physical Literacy* and *simplexité* , this research starts from the hypothesis that the implementation of the Conceptual Model Holistic Movement Therapy (MCH) is not simply a simple increase in physical activity, but rather a systemic neurocognitive enhancement intervention. It is hypothesized that consistent exposure to highly cognitively complex movement tasks can generate measurable changes in various areas of adolescent development.

Research Hypothesis:

1. **Enhancement of Executive Functions (EF):** It is hypothesized that students participating in the MCH will show, compared to the control group, a significant reduction in latency times in motor *problem -solving tasks* . The constant training of inhibition, flexibility, and working memory—required by having to adapt their movements in confined spaces—will translate into improved sustained attention span, even in subsequent class periods.

2. **Reduction of Academic and Emotional Dropout:** Increased perceived self-efficacy and reduced stress (mediated by controlling cortisol levels) are expected to lead to a decrease in episodes of demotivation and behavioral disturbance. The MCH "motor laboratory," acting as a *safe space* , will foster greater psychological resilience, reducing the perception of "foreignness" toward the school institution, typical of at-risk contexts.

3. **Social Inclusion as a "Side Effect" of Movement:** It is hypothesized that, through the cooperation required to manage the complexity of motor tasks, social isolation will be reduced. Physical activity, no longer oriented toward individual competition, will become a relational glue that reduces the gap between students from different sociocultural backgrounds.

Expected impact on results:

The model validation aims to demonstrate that:

- **At the neuro-educational level: Evidence-**based physical education based on neurocognitive skills is more effective than traditional performance-based instruction in improving overall academic performance.
- **Infrastructural:** The lack of space in Neapolitan schools is no longer an educational impediment. The MCH transforms material limitations into a pedagogical lever, demonstrating that the quality of education depends on cognitive planning rather than the size of sports facilities.

- **At the systemic level:** The expected results suggest the possibility of replicating the MCH not only as a model of EF, but also as a cross-cutting strategy for combating youth distress. Demonstrating that "intelligent" movement can improve emotional management and concentration skills would make the MCH a benchmark of *best practice* .

These results, if confirmed by the survey, will provide the basis for a paradigm shift: physical education not as a marginal discipline, but as a fundamental pillar of adolescents' comprehensive education in the contemporary Italian school system.

7. Conclusions and Prospects for Replicability

In conclusion, the Conceptual Model Holistic Movement (MCH) is intended not as a curricular addition, but as a necessary evolution of physical education. The challenge of making inclusion a tangible reality in Naples' vulnerable neighborhoods involves strengthening students' neurocognitive processes , transforming movement from an exercise end in itself into a powerful tool for functional and social literacy.

The adoption of the MCH demonstrates that educational effectiveness is not dependent on the availability of excellent infrastructure, but on the teacher's planning ability to interpret environmental criticalities as variables of a "concentrated complexity." Through the application of the principles of *simplexité* and the promotion of *Physical Literacy* , it is possible to convert classrooms—often experienced as places of constraint—into laboratories of cognitive and relational freedom, where learning occurs through the body and its intelligent interaction with the environment.

The model's replicability prospects are broad. Although the MCH was created to address the urgent needs of the Neapolitan context, its methodological architecture—based on neuroscientific evidence and adaptive flexibility—makes it a prototype that can be exported to any school setting characterized by marginalization or resource shortages. Validation of the model through the proposed evaluation protocol paves the way for possible recognition as a national *best practice* : a physical education program that, by focusing on the development of executive functions and adolescent well-being, actively contributes to combating school dropout and sustainably promoting a more aware and resilient citizenry.

Ultimately, MCH does not simply teach "how to move," but educates "how to think and act" in a complex world, restoring Physical Education to its scientific dignity and its primary role in building the future of new generations.

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Appendix A: Teacher Observation Sheet

This form is designed for real-time monitoring during MCH sessions. It is recommended that you complete it at the end of each teaching unit.

Observation	Scale (1-4)	Operating Notes
Latency time (speed of reaction to the signal)		1: Slow/distracted; 4: Immediate/reactive
Interaction with space (creative use/optimization)		1: Static; 4: Exploratory/Effective
Level of cooperation (mutual help in the task)		1: Isolated; 4: Proactive/Inclusive
Inhibitory control (impulse management)		1: Impulsive; 4: Self-regulated
Cognitive flexibility (adaptation to changes in rules)		1: Rigid; 4: Adaptive

Glossary of Key Terms

- **Executive Functions (EF):** Higher-level cognitive processes, including inhibition, working memory, and cognitive flexibility, necessary for controlling behavior and achieving complex goals.
- **Physical Literacy :** The motivation, confidence, physical competence, understanding, and knowledge that enable an individual to value and maintain engagement in physical activity throughout their life.
- **Simplicity (*Simplexité*):** Neuroscientific concept that defines the set of solutions that living organisms have developed to manage the complexity of the world and facilitate action, not by eliminating complexity, but by making it manageable.
- **Vicariance:** Ability of the nervous system to use alternative neural circuits or motor strategies to compensate for a function or solve a problem when the usual pathway is impeded or unavailable.